

66. (currently amended) The method of claim 65, further comprising converting a copy of the ~~thumbnail~~ low resolution image to a grayscale image.

67. (currently amended) The method of claim ~~66~~ 65, further comprising identifying pixel blocks that are likely to contain remaining boundary edges and flagging these blocks as edges that should not be considered for high resolution imaging.

68. (original) The method of claim 65, further comprising analyzing mean and standard deviation of local pixel intensities and combining the mean and the standard deviation to generate a threshold value.

69. (original) The method of claim 68, further comprising using the intensities to differentiate ~~tissue-containing~~ sample-containing regions from blank regions and other ~~non-tissue~~ non-sample containing regions.

70. (original) The method of claim 65, further comprising applying morphological filters to threshold standard deviation data to refine classification based on size and position of neighboring groups of potential ~~tissue~~ sample pixels, whereby the morphological filters process pixels of the cropped image in groups that correspond to slide regions that can be imaged individually during a high-resolution scanning process.

71. (original) The method of claim 53, wherein controlling comprises attaching a Ronchi ruler to the motorized stage.

72. (original) The method of claim 71, wherein controlling further comprises utilizing a light sensor that is mechanically isolated from the Ronchi ruler, whereby as the Ronchi ruler passes under the light sensor a series of electronic pulses that corresponds to alternating light and dark bands of the Ronchi ruler is generated.

73. (original) The method of claim 53, wherein capturing further comprises capturing images of tiles with precise alignment until a row is finished.

74. (original) The method of claim 53, wherein capturing further comprises capturing images of tiles with precise alignment until a controlling program tells the system to stop.

Remarks

Status of the Application

In the Office Action, the Examiner rejected claims 1, 2, 4-13, 16-23, 26-31, 33 and 43 under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 5,875,258 to Ortyn et al. (hereinafter "Ortyn"). The Examiner also rejected

claims 3, 32, 34-42, 53, 54, 65-70, 73, and 74 under 35 U.S.C. §103(a) as being unpatentable over Ortyn in view of United States Patent No. 6,674,879 to Weisman et al. (hereinafter "Weisman") and claims 24, 25, 71, and 72 as being unpatentable over Ortyn in view of United States Patent No. 5,592,313 to Hart (hereinafter "Hart").

The Examiner further stated that claims 14, 15, 44-52, and 55-64 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims.

In the Drawings

In the Office Action, the Examiner required that a petition be filed for the color drawings submitted with the application to be acceptable as drawings. Applicants point out that such a petition and its related fee were submitted on July 31, 2001 with the originally filed application.

In the Claims

Rejections under 35 U.S.C. §102(b)

Ortyn discloses an automated test to identify deviations in automated cytology system performance. See column 2, line 21 and 22. Ortyn discloses an apparatus that includes an illuminator, imaging optics, a CCD camera, an illumination sensor, and an image capture and focus system that includes a processor. See column 6, lines 44-66. Ortyn also discloses a microscope having a movable stage. See column 7, lines 38-50.

Ortyn discloses a method for checking global illumination to ensure the field of view is illuminated at the proper intensity and that the global intensity does not vary by more than a limit. See column 11, lines 24-27. That method determines maximum, minimum, mean, and coefficient of variation of illumination. See column 11, lines 30-32. At column 13, line 10 to column 14, line 3, Ortyn discloses a global illumination test to check the illuminance level of a

light source that includes acquisition of images having pixel arrays that are quantized into 256 gray levels and tabulating mean pixel intensity levels. Beginning at column 14, line 4, Ortyn discloses a method for checking static field of uniformity, or variations in illumination intensity, at various points in an illuminated field of view. In that method, maximum, minimum, mean, and coefficient of variation of illumination are again utilized. See column 14, lines 21-23. At column 15, beginning at line 11, dynamic field uniformity is checked using pixel illumination values.

Beginning at column 16, line 47, Ortyn discloses a method of checking strobe repeatability. In that method, pixel intensity is computed to characterize camera response at selected illumination levels. See column 18, lines 40-51.

Ortyn discloses a modulation transfer function test beginning at column 19, line 39 that comprises "a curve of contrast in the image plane versus spatial line frequency of a sinusoidal input in the object plane." In that test, the contrast in the image plane is said to decrease as the line frequency of the object increases. See column 19, lines 46-56.

Ortyn goes on to describe a suite of tests for characterizing focus illumination quality, noise floor level, focus filter frequency response, focus camera frequency response, focus camera longitudinal separation, focus camera lateral and angular alignment and closed loop accuracy of an auto focus system as used in an automated scanning instrument beginning at column 23, line 62. Ortyn states that in a preferred embodiment, the focus apparatus uses an above and below focus camera frequency balancing method to determine the magnitude and direction to move to best focus. See column 24, lines 35-38. The system for checking illumination quality again utilizes mean illumination and coefficient of variation of the intensity. See column 26, lines 10-14. To check focus noise floor level, focus filters optimize signals from the cameras by filtering out objects that do not have the characteristic frequency content of cellular nuclei. See column 27, lines 53-61.

To determine the focus projection of best clinical value, a band-pass filter is chosen to weigh frequencies that are generated by cellular nuclei. See column 28, lines 62-66. As may be seen in the equation described in column 29, line 10 to column 30, line 11, pixel intensity is the basis of weighing frequencies generated by cellular nuclei.

At column 35, lines 39-42, a camera assembly provides an above focus image signal and a below focus image signal. Ortyn then discloses determining the proper positioning of the slide along the optical path, the processor need only determine how far the slide must be displaced for the energy provided by the above and below focus image signals. See column 35, line 66 to column 36, line 3. Ortyn also discloses positioning the motion controller in a plurality of X-Y positions to obtain a plurality of image signals indicative of a respective plurality of images of the specimen, wherein whether the slide is focused is determined by examining the band-pass frequency of the above and below focus image signals at column 36, lines 10-22.

At column 40, lines 40-55, Ortyn suggests that a novel aspect of his invention is the ability of the processor to determine whether an image is in focus, determine a direction in which the specimen should be moved, and to determine the distance of motion necessary to bring the specimen into focus.

Claims 1-7

The Examiner rejected claim 1 as being anticipated by Ortyn.

Applicants have amended claim 1 to include the capture of a low resolution image and the capture of a high resolution image of the target that corresponds to the pixels of the low resolution image determined to contain the target. Applicants submit that Ortyn does not disclose at least the capture of a low resolution image and the capture of a high resolution image of the target that corresponds to the pixels of the low resolution image determined to contain the target, as recited in amended claim 1 of the Subject Application. Ortyn rather

discloses tabulating pixel intensity level for testing a light source and for weighing frequencies that are generated by cellular nuclei.

Claims 4 and 5 have also been amended to clarify the subject matter of those claims and not for the purpose of overcoming any rejection put forth by the Examiner.

Thus, Applicants submit amended claim 1 is patentable over Ortyn because Ortyn does not teach or suggest all of the limitations of claim 1. Furthermore, claims 2-7 are seen to be patentable because they depend from patentable claim 1.

Claims 8-15

The Examiner also rejected claim 8 as being anticipated by Ortyn.

Applicants submit that Ortyn does not disclose at least an imaging apparatus having a processor that develops a focus surface based on stage position and object distance for at least three selected points as recited in claim 8. Rather, Ortyn discloses a camera assembly that provides an above focus image signal and a below focus image signal and determines proper positioning of the slide along the optical path using the energy provided by the above and below focus image signals. Ortyn also discloses positioning the motion controller in a plurality of X-Y positions and focusing based on the band-pass frequency of above and below focus image signals. Ortyn does not, however, disclose at least the development of a focus surface.

Applicants note with appreciation the Examiner's finding that claims 14 and 15 would be allowable if rewritten in independent form. Applicants note that they have amended claims 14 and 15 only to clarify the subject matter of those claims since Applicants believe claim 8, from which claims 14 and 15 depend, is allowable.

Accordingly, Applicants submit that claim 8 and claims 9 to 15 that depend therefrom are patentable because Ortyn does not teach or suggest all of the limitations of claims 8-15.

Claims 16-18

The Examiner also rejected claim 16 as being anticipated by Ortyn.

Applicants submit that Ortyn does not disclose at least a pulsed light that illuminates in response to a stage position sensor as recited in claim 16. More particularly, Applicants submit that Ortyn does not disclose use of a stage position sensor. Thus, Applicants submit that claim 16 and claims 17 and 18 that depend therefrom are patentable because Ortyn does not teach or suggest all of the limitations of claims 16-18.

Claims 19-52

Claim 19 has been amended to clarify the subject matter of that claim and not for the purpose of overcoming any rejection put forth by the Examiner.

Claim 19 recites, *inter alia*, a pulsed light illumination system that optically stops motion on the motorized stage while allowing continuous physical movement of the motorized stage, a stage position detector that controls firing of the pulsed light illumination system at predetermined positions of the motorized stage, identifying sample regions on a slide, capturing a montage image, and enabling accurate focus control of optical elements without requiring the stage to be stopped and refocused at each tile location. Applicants submit that Ortyn does not disclose any of those elements of claim 19.

In particular, Applicants submit that Ortyn does not disclose a pulsed light illumination system that optically stops motion on the motorized stage while allowing continuous physical movement of the motorized stage and does not disclose a stage position detector or use of the stage position detector to control firing of the pulsed light illumination system at predetermined positions of the

motorized stage, as recited in claim 19. Rather, Ortyn discloses checking global illumination to ensure a field of view is illuminated at a proper intensity and that the global intensity does not vary by more than a limit and checks strobe repeatability but does not disclose stopping motion of a moving slide to capture images of the slide.

Moreover, Applicants submit that Ortyn does not disclose a system that determines locations of a sample on the slide as recited in claim 19. Rather, Ortyn discloses tests to identify deviations in automated cytology system performance.

Ortyn also does not disclose controlling optical element focus when capturing an image without stopping the stage at each tile location, as recited in claim 19. Rather, Ortyn discloses a camera assembly that provides an above focus image signal and a below focus image signal and determination of the proper positioning of the slide along the optical path using the energy provided by the above and below focus image signals.

Applicants request that the Examiner withdraw claim 42. Claims 21, 31, 35, 45, 48, and 50 have been amended herein to clarify the subject matter of those claims and not for the purpose of overcoming any rejection or objection put forth by the Examiner. Claims 27 and 33 have been amended herein to correct the dependency of those claims and not for the purpose of overcoming any rejection put forth by the Examiner. Claims 34, 36-40, 43, and 44 have been amended herein to correct the dependency of those claims and to clarify the subject matter of those claims but not for the purpose of overcoming any rejection or objection put forth by the Examiner.

Applicants note with appreciation the Examiner's finding that claims 44-52 would be allowable if rewritten in independent form. Applicants note that they have amended claims 44, 45, 48, and 50 only to clarify the subject matter of those claims since Applicants believe claim 19, from which those claims depend, is allowable.

Accordingly, Applicants submit that claim 19 is patentable because Ortyn does not teach or suggest all of the limitations of claim 19. Furthermore, claims 20-41 and 43-52 are seen to be patentable because they depend from patentable claim 19.

Claims 53-74

Claim 53 has been amended to clarify the subject matter of that claim and not for the purpose of overcoming any rejection put forth by the Examiner.

Claim 53 recites, *inter alia*, capturing a low resolution image of the slide to identify sample locations on the slide; capturing a montage image by enabling accurate focus control of optical elements without requiring that the motorized stage be stopped and refocused at each tile location in the montage image; and capturing image tiles with precise alignment by executing a strobe illumination system whenever a stage position sensor determines that the motorized stage has moved to a neighboring field of view of a camera.

Applicants submit that Ortyn does not disclose capturing a low resolution image of a slide to identify sample locations on the slide. Moreover, as has been discussed previously herein, Applicants submit that Ortyn does not disclose capturing a montage image without requiring that the motorized stage be stopped, or capturing image tiles with precise alignment by executing a strobe illumination system whenever a stage position sensor determines that the motorized stage has moved to a neighboring field of view of a camera.

Claims 54-57, 59, 60, and 65-67 have been amended to clarify the subject matter of those claims and not for the purpose of overcoming any rejection or objection put forth by the Examiner. Applicants note with appreciation the Examiner's finding that claims 55-64 would be allowable if rewritten in independent form. Applicants note that they have amended claims 55, 56, 57, 59, and 60 only to clarify the subject matter of those claims since Applicants believe claim 53, from which those claims depend, is allowable.

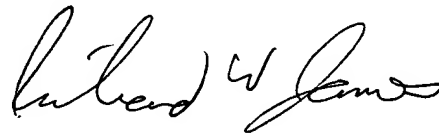
Accordingly, Applicants submit that claim 53 is patentable because Ortyn does not teach or suggest all of the limitations thereof. Furthermore, claims 54-74 are seen to be patentable because they depend from patentable claim 53.

Conclusion

Applicants respectfully submit that claims 1-41 and 43-74 are in condition for allowance. Applicants also submit that no new matter has been introduced in the amendments presented herein. Accordingly, reconsideration of the present objections and rejections and passage to allowance of claims 1-41 and 43-74 at an early date are earnestly solicited.

If the Examiner is of the opinion that the Subject Application is in condition for disposition other than allowance, the Examiner is respectfully requested to contact Applicants' Attorney at the telephone number listed below so that any concerns may be expeditiously addressed.

Respectfully Submitted



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